FEMP Designated Product: Gas Water Heaters

Leading by example, saving energy and taxpayer dollars in federal facilities

Purchasing Specifications for Energy-Efficient Products

Legal Authorities

Federal agencies are required by the Energy Policy Act of 2005 (P.L. 109-58) and Federal Acquisition Regulations (FAR) Subpart 23.2 to specify and buy ENERGY STAR®-qualified products or, in categories with no ENERGY STAR label, FEMP-designated products which are among the highest 25 percent of equivalent products for energy efficiency.

Performance Requirement for Federal Purchases		
Storage Type (rated volume)	Energy Factor[a]	Annual Energy Use[b]
50 gallons or less	0.62 or higher	242 therms[c]/year or less

a) Energy Factor is an efficiency ratio of the energy supplied in heated water divided by the energy input to the water heater.

b) Based on DOE test procedure (10 CFR 430, Sub-Part B, Appendix E).

c) 1 therm = 100,000 Btu

Buying Energy-Efficient Gas Water Heaters

This purchasing specification applies to residential, gas, storage-type water heaters with capacities between 20 and 50 gallons and maximum energy input of 75,000 Btu per hour. When purchasing gas water heaters directly from commercial sources, check the yellow EnergyGuide labels for models with Annual Energy Use (therms/year) at or below the level shown in the *Performance Requirement* table. In contracts and solicitations specify that gas water heaters meet or exceed the energy factor (EF) shown above.

The federal supply sources for gas water heaters are the General Services Administration (GSA) and the Defense Logistics Agency (DLA). GSA sells water heaters through its Multiple Awards Schedule program and online shopping network, *GSA Advantage!* DLA offers them through the Defense Supply Center Philadelphia and online through DoD *EMall*. GSA and DLA typically include EF in the product data they list for water heaters. When buying from GSA or DLA, look for water heaters that meet or exceed the EF requirement of this *Specification*.

Performance requirements apply to all forms of procurements, including: guide and project specifications; construction, renovation, repair, maintenance and energy service contracts, lease agreements and solicitations for offers. Energy performance requirements should be included in all evaluations of solicitation responses. Model language to assist agencies with incorporating these performance requirements into their procurement documents is available at http://www.eere.energy.gov/femp/procurement/eep_modellang.cfm.

If neither EF nor annual energy use data is available, check the water heater's make and model number against the products listed in the *GAMA Directory* (see *For More Information*). This online resource contains EF and other performance data for most of the gas water heaters sold in the US.

Buyer Tips

Storage-type water heaters are the most commonly used products, but also the least efficient. Because they keep tanks full of water heated at all times and are typically located away from the points of use, storage-type water heaters have high standby losses. Tankless water heaters (also called demand-type or instantaneous) heat water as it is needed and, due to their compact size, are typically located near the point of use. Absence of a storage tank and shorter distribution lines greatly reduce standby losses and increase efficiency. Some large demand-type products can provide a sufficient amount of hot water for a whole house. Depending on climate and energy costs, solar-assisted water heaters may be cost-effective. Other efficient options include indirect water heaters, which are connected to a home's boiler or integrated systems,

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which are large water heaters that also provide space heating. However, these options require additional analysis and design to work properly.

Water heaters must be sized properly. Over-sized water heaters not only cost more but increase energy use due to excessive cycling and higher standby losses. ACEEE's *Consumer Guide* and GAMA *Consumer Directory* (*see For More Information*) provide guidance on proper sizing. A water heater should be selected based on first-hour rating (FHR), not tank size. Some water heaters with small tanks and large burners have higher FHRs and are more efficient than models with larger tanks. When installing a storage-type product, select the smallest water heater that meets the FHR and this *Specification*. In situations where a large water heater is required (FHR of 100 gallons or more), it may be preferable to install two smaller units. For example, two 40 gallon water heaters (min. EF = 0.59) provide as much hot water during the first hour as a 100 gallon unit (min. EF = 0.48).

User Tips

Energy costs increase with temperature. Dishwashers require the hottest water of all household uses, typically 135 to 140° F. However, these devices are usually equipped with booster heaters to raise the incoming water temperature by 15 to 20° F. Setting the water heater between 120 and 125° F and turning the dishwasher's booster on should provide sufficiently hot water while saving energy and reducing the chances for scalding.

Cost-Effectiveness Example

Performance	Base Model[a]	Required	Best Available[b]
Energy Factor (EF)	0.59	0.62	0.85
Annual Energy Use (therms/year)	254	242	176
Annual Energy Cost	$152	$145	$106
Lifetime Energy Cost[c]	$1,385	$1,320	$960
Lifetime Energy Cost Savings	–	$65	$425

a) The efficiency (EF) of the Base Model is the minimum allowed by current US DOE appliance standards.

b) More efficient products may have been introduced to the market since this specification was published. Performance data for the best available model was obtained from the November 2005 GAMA Directory (see *For More Information*).

c) Lifetime Energy Cost is the sum of the discounted value of annual energy costs based on average usage and an assumed water heater life of 13 years. Future electricity price trends and a discount rate of 3.0% are based on federal guidelines (effective from April, 2005 to March, 2006).

Cost-Effectiveness Assumptions

In the example above, the *Base Model* is a 40 gallon storage tank water heater with an EF of 0.59, the *Required* water heater is a 40 gallon storage type with an EF of 0.62 and FHR of 70 gallons, and the *Best Available* is a demand-type water heater with an EF of 0.85 and flow rate of 4.0 gallons per minute (FHR > 70 gallons). Annual energy use in this example is based on the standard DOE test procedure and calculated assuming an inlet water temperature of 58° F, a setpoint of 135° F, daily hot water demand of 64 gallons, and 365 days per year of use. The assumed gas price is 60¢ per therm, the average at federal facilities in the US.

Using the Cost-Effectiveness Example

In the example above, the *Required* water heater is cost-effective if its purchase price is no more than $65 above that of the *Base Model*. The *Best Available* model is cost-effective if its installed cost is no more than $425 above the *Base Model*.

What if my Energy Price is different?

FEMP provides a Web-based cost calculator for water heaters. Go to http://www.eere.energy.gov/femp/technologies/eep_waterheaters_calc.cfm and input the rate for natural gas at your facility. The output section will automatically display results that better reflect your energy costs.

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For More Information:

EERE Information Center
1-877-EERE-INF or 1-877-337-3463
www.eere.energy.gov/femp/procurement/

General Services Administration
(816) 926-6760
www.fss.gsa.gov/
www.gsaadvantage.gov/

Defense Logistics Agency
www.dla.mil/
www.emall.dla.mil/

Defense Supply Center Philadelphia
(800) DLA-BULB or (215) 737-7950
www.dscp.dla.mil/

American Council for and Energy Efficient Economy (ACEEE) publishes the *Consumer's Guide to Home Energy Savings* which contains a chapter on water heating and list of energy-efficient products. This guide is available from ACEEE at:
(202) 429-0063
www.aceee.org/

Gas Appliances Manufacturers Association (GAMA) publishes the *Consumer's Directory of Certified Efficiency Ratings for Heating and Water Heating Equipment.* This directory is available at:
(703) 525-9565
www.gamanet.org/

Lawrence Berkeley National Laboratory provided market research and life cycle cost analysis in support of this energy efficiency purchasing specification.
(202) 646-7950

A Strong Energy Portfolio for a Strong America

Energy efficiency and clean, renewable energy will mean a stronger economy, cleaner environment, and greater energy independence for America. Working with a wide array of state, community, industry, and university partners, the U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy invests in a diverse portfolio of energy technologies.

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